LETTER TO THE EDITOR

Dear CROSSTALK Editor,

In the March 2006 issue, Yuri Chernak, in his article *Understanding the Logic of System Testing*, outlined a possible methodological similarity between software testing and mathematical logic. I feel reality of software testing has a close resemblance to the way that experimental science works.

Some mathematical proofs devel-

oped in theory of software testing concerning the inexistence of a constructive criterion (i.e. algorithm) to derive the socalled Ideal Test Suite, (the silver bullet of system testing), state that the main goal of testing is restricted to show the presence of failures because testing can never completely establish the correctness of an arbitrary software system.

Skipping all formal aspects, these theoretical results are well summarized: Program testing can be used to show the presence of bugs, but never to show their absence!

Then the methodology of software testing is well rooted in modus tollens (Latin: mode that denies). Modus tollens is the formal name for contrapositive inference and can also be referred to as denying the consequent – it is a valid form of logical argument.

In fact, in experimental sciences, no number of positive outcomes at the level of experimental testing can confirm a theory, but a single counter-instance shows the scientific theory – from which the implication is derived – to be false.

Then, falsification with experimental implementation of modus tollens is just as essential to software testing as it is to scientific theories. Indeed, no number of passed test suites can prove the correctness of a program, but a single failed test suite shows the program to be incorrect.

Effective testing requires an empirical frame of reference rather than a theoretical one: Software reality is more about science than it is about computer science.

Software testing, for mathematical and theoretical reasons, is firmly set in the framework of experimental sciences and we need to see it in this perspective if we want to increase the comprehension of methodology and practice of software testing.

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